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THE DEVELOPMENT OF THE NOTION OF CAUSE.

THE animal kingdom is very obviously divided into very different species. The difference to the eye between a lobster and an eagle is so great that it is difficult to realize they have anything in common. The pre-evolution notion that specific acts of creation were required to beget each animal species, well suits the extraordinary diversities that present the animal kingdom in the guise of a disparate collection of eccentric shapes and fashions. If we think of the more fantastic of living animals, such as the lizard, the serpent, the kangaroo, and the sea-lion; add to them the extraordinary variety of size, shape, and habit revealed in the modern reconstruction of prehistoric animals; and contrast the polymorphous, almost invisible, ameba of the stagnant pool with the huge elephant of the jungle, we realize very vividly how nature has concealed the continuous course of evolution beneath a bewildering array of diverse forms.

When evolution culminated in man, this distribution into widely differing biological species ceased. The different races of men represent simple variations of the same biological pattern. The minor variations within the human family, such as differences in color, stature, and hair, are but the faint echoes of those deep diversities that seem to divide the animal world into species with no visible points of contact. The men who lived more than 400,000 years before the Sphinx set her watch on the desert, seem to have been, when mere minor variations are counted out, biologically identical with the man of to-day. Evolution exhausted her stock of biological diversities by her previous prodigality, and continued to shape man in the same biological mould.

But within the evolution from primitive man to the civilization of to-day there is a parallel to animal diversity. Biological species have been succeeded by *mental* species. There is a difference of mental habit between the man of the pliocene and the man of the modern city comparable with the contrast between the crustacean crab and the avian swallow. Mental diversity and biological diversity cannot be compared as two mountains can be compared in size—it is remotely metaphorical to compare the mental distance between a Kant and a primeval savage with the biological distinction between an amœba and a tiger. There is a parallel, however, as evident at it is wide. Widely diverse biological species mark stages in a continuous evolutionary course. The history of human thought reveals a continuous mental development connecting many diverse mental species.

There is the force of a revelation in passing from the perception of the remarkable diversities to their underlying connection in the process of evolution. To appreciate the full uniting strength of evolution, the first vision of the earth as the habitat of apparently disunited kinds is an indispensable preliminary. The realization that men do think differently, and often so differently that they seem to be as divided mentally as the sea-urchin and the rhinoceros are divided biologically, during the different stages of human thought, should precede the attempt to understand how the mind of the primitive has grown into the mind of the modern European.

Wundt remarks that there are two sets of data for deducing the habits and thoughts of primitive man—*under* and *on* the earth. The skeletons from prehistoric graves or the implements buried in the earth give relatively little information of value for the knowledge of the primitive mind. The debris of primitive culture scattered *under* the earth's surface do, however, support, if they do not prove, the inference that primitive culture in general has been very stable, and confirm the conclusion that the primitive mind can be studied *on* the earth. Wundt means that primitive habits of thought are still preserved in the backward races of the world. The first men have left no trace either of themselves or of their thinking; but they have bequeathed, if not their actual beliefs, their general habit of belief to many yet undeveloped races. By investigating the beliefs of the earlier civilizations as they are recorded in myth, folk-lore, epic, sacred writings, or inscribed monuments, more particularly by the study of living backward peoples, it is possible to distinguish with some degree of adequacy the mental species that line the route of evolution. Two sharply defined types of primitive belief (selected from among many) serve to indicate the mental chasm between earlier and later thought. An appreciation of this chasm prepares the mind for a more vivid apprehension of the remarkable movement of thought that has bridged its opposite and seemingly remote sides.

A modern novel illustrates a curious persistence of one way of thinking favored by the primitive mind. Since it is obviously a relic of a past mental habit its incongruous appearance in a modern setting emphasizes the difference it really establishes between the primitive and ourselves. The author announces his program in a preface. He intends, he informs us, to *prove* that women can succeed as well as men in the professions. His thesis, that women can paint and write as ably as men, is probably quite unexceptionable—perhaps is a modern advance on the primitive incredulity. His *proof* is as primitive as his thesis is modern. He dresses his two heroines as men, he sends them into the arena of life, one as a painter, the other as a journalist; and he makes them succeed by the simple process of describing their success. This curious notion, that to prove that a certain event can happen it need only be made to occur in a novel, is a striking reversion to the primitive custom of securing a result by imitating it. Perhaps this prejudice may survive even the reign of woman; perhaps in some future novel a woman may attempt to prove, by disguising her hero in feminine dress and making him a successful pleader, that man, if he be given a chance, can be as eloquent as his sisters.

Though no modern seriously believes that we can deduce real events from imaginary occurrences in novels, the primitive genuinely believes that events can be produced by imitating them. Practices based upon this belief are so diverse and so universal among primitive peoples, and they persist so obstinately as civilization advances, that the habit of thought they represent, however this may be finally interpreted, is obviously a characteristic part of the structure of the primitive mind. To kill my enemy, argues the primitive, I need only make an image of him in wood or wax or clay and pierce this image with my spear. No doubt, we simplify his thought by speaking simply of an endeavor to secure a result by imitating it. He will probably sing charms, or pray, or annoint his image with magically potent blood or fat; he may even lay a real ambush. Sometimes he seeks divine or spiritual aid to help on his effort. But the central core, imitating an event to make it happen, appears again and again in the records of savage, and even of relatively civilized, practice. Wax models of ships were found in an Egyptian temple. By floating these models in water and making them sink it was supposed that the enemy fleet could be destroyed. Magicians have swung themselves, in many lands, to make the corn grow. Australian savages imitate the life history of the witchetty grub to promote the reproduction of this particular food. Pouring out water occurs in rituals for producing rain. The list of instances, if made complete, would stretch out, like the procession of kings in *Macbeth,* "until the crack of doom."

Dr. Frazer reserves a special term, "imitative magic," for the many and varied rites presenting the common feature of imitating an event to make it happen. Imitation alone is not a sufficient explanation of the mental habit expressed in imitative magic; but the prevalence of practices in which we can easily detect the common element of attempting to produce events by some performance that resembles them, points clearly to a primitive habit of thought that marks a well-defined mental species. Guy Fawkes is still burned in effigy; but no modern would seriously propose, though assisted by an elaborate ritual, to execute a murderer by hanging his proxy.

The primitive mind differs from the civilized in its opinion of the animal. Wundt attempts to divide the development of human thought into four roughly defined stages. In the second or totemic stage men have much concern for their relations with the brutes. They include them in their ancestry, and they include them as members of their tribes or tribal groups. In Australia the ancestor of a tribal group may be a kangaroo, or a snake. "Emu men" class themselves with emus, or emus with themselves. The animals have often the status of senior members of the tribal group in which they are included. Wundt contrasts the totemic estimate of the animal with the civilized estimate by describing it as the exact inverse. The totemist considers the animal his superior: civilized man thinks of it as vastly his inferior. Primitive man must distinguish between the animal and himself: kangaroos, snakes, and all the varied fauna of the earth strike his eye and affect his senses differently from his fellows. But he makes his distinction very differently from his more civilized descendant. The animal may be his fellow-tribesman and may be the progenitor of his tribe. It may be more magically potent, wiser, and more deserving of reverence, than the oldest and wisest of his human kin. An animal may have founded the rites and ceremonies that his tribe performs to maintain its existence. A view of the animal so contrary to every modern idea, whatever be the ultimate causes on which it rests, denotes a difference of mental habit so pronounced that it establishes a veritable separate mental species. By his practice of imitative magic and by his conception of the animal, primitive man is as separated mentally from man to-day as the elephant is biologically separated from the crow.

Strategical position is as important in thought as in military art. Warfare strives both for strategical hold and for strategical vision—strategical hold to concentrate attack on weak or crucial points, strategical vision to observe in full the enemy dispositions. The strategic view-point has the important parallel in thought. To put the right question, to secure the conception that arranges the facts in a significant way, is a primary aim of all inquiry. The philosopher seeks a point of view that will present the whole universe in its most significant aspects; but in all inquiries the human mind must be content to procure as many illuminating view-points as possible.

One survey of the course of human thought on its way from primitive notions of the world to modern ideas is obtained from the concept of "transformation." Many notions converge on, or diverge from, the idea of transformation. This conception, therefore, gives an aeroplane view—displaying currents of thought as a country is spread out before the aviator. The fairy godmother transformed a pumpkin into a coach for Cinderella. The pumpkin had no qualifications for conversion into a coach: it was metamorphosed by fairy magic. For the primitive, transformation is metamorphosis—a conversion of one thing into another that does not depend on any connection between the two objects. The cause of the metamorphosis resides in a force purely external to the object transformed; and anything can, generally speaking, be metamorphosed into any other. Certain stones in the sacred territory of an Australian tribe are believed to metamorphose, at appropriate times and under appropriate conditions, into kangaroos. In the Greek myth, Deucalion and Pyrrha repeopled the world after the flood by the metamorphosis into human beings of stones they threw behind them. Metamorphosis, the transformation of unconnected things into one another, appears persistently in the myths, legends, and folk-tales of the world. The Prince is changed into a beast; Daphne becomes a laurel-tree; Zeus seeks Europa as a bull; Niobe is transformed into a fountain. Metamorphosis between animals and men remains persistently in lower cultures, as the most plausible residue of universal metamorphosis. The werwolf legend, of humans oscillating between the forms of wolves and human beings, is scattered through the world. Witches regularly become cats or hares in folk-tales.

The constant recurrence of metamorphosis in the stories of the world intimates a primitive belief in the possibility of transforming anything into virtually anything else. The metamorphosis is usually associated with some magic force that constrains the transformation. Novels written in the nineteenth century, though they contain fictitious incidents, reveal the writer's estimates of possibility. One author may introduce events regarded by his contemporaries as purely mythical, to constitute an allegory or to amuse. Fairy-tales are still written for children. Swift used the improbable to give edge to the satire of Gulliver. But the literature of any century, taken as a whole, reveals that century's estimate of possibilities. It is possible that the future literature of the twentieth century may reveal clearly that both authors and public believe that the dead may return, that seers can read the future, and even that the sleeper can visit the country he will enter when he dies. If these beliefs become real and widespread estimates of possibility, they will become ordinary items of literature. Metamorphosis is an ordinary item in the early stories of the world, and thus represents a primitive estimate of possibility. The present beliefs of peoples in primitive and lower-grade culture confirm the evidence of literature and tradition. The concepts connected with transformation thus divide the primitive and modern minds into different mental species, just as do the concepts attached to imitative magic and to the relation between man and beast. The study of the concept of transformation provides a particularly favorable opportunity for observing how the beliefs of the primitive develop into the beliefs of modern man.

The human mind begins by supposing that any transformation is possible. As thought advances, the notion of development is substituted for the belief in metamorphosis. Transformation is seen to follow certain paths, and change is seen to depend on the qualifications of the objects that change. Looking down on the course of human thought from the standpoint of the idea of transformation, the concept of arbitrary metamorphosis, under the complete constraint of magical forces external to itself, gradually passes into the realization that things develop from, and into, one another under the regulation of laws. The belief in metamorphosis is replaced, gradually and surely, by the recognition that transformation proceeds along definite routes.

It has been often supposed that we attain to the notion of *cause* by observing series of events that conform to a regular sequence. Thirst disappears after drinking and, since drinking must precede the disappearance of thirst, we think of the drinking as cause and the disappearance of thirst as effect. Hume thought that causes and their effects appear to us to be linked by a necessity because we notice that they constantly occur in succession. When B happens after A has happened and B never takes place without the previous occurrence of A, the belief naturally arises, Hume argued, that A produces B—that there is a necessary causal connection between A and B. The primitive conception of transformation as metamorphosis constrained by a magical force recognizes, however, a *tie* between cause and effect without recognizing the necessity, or even the existence, of uniform sequence. The notion of a tie between causes and their effects is the essential element in the concept of causality. A uniform sequence, as of day and night, may be repeated *ad nauseam* without coming under the adjective "causal." Wolves, tigers, and other beasts roamed through the gardens of Circe's palace. She transformed, by her magic arts, the companions of Odysseus into swine, as she had transformed other unfortunates into other animals. If she had metamorphosed each individual into a different beast she would have exerted causal actions that presented no uniformity of sequence. Or, if the metamorphosis man-into-beast were the sequence repeated, she might have transformed one man, and one man only, into a pig or tiger or other animal; there would still have been causal action though without any repetition of sequences. Uniform sequences need not be causal and causal connections need not be repeated—it is possible to think of repetitions as uncaused and it is quite possible to recognize that one event may cause another on its one and only occurrence in the universe.

One trend of modern thought threatens a curious fate for Hume's argument. Hume argued that uniformity or regularity of succession imposes upon us the notion of necessary connection or causation. Many thinkers now suppose that science is relieved by the existence of uniformities from the necessity of believing in causes. Science, according to their view, has merely to describe the uniformities that occur and formulate their rules. The universe has certain regular habits. Hume's argument that we deduce from regularity to cause is replaced by the notion that regularity only requires a formula or merely a description of the regularities observed.

The gradual recognition that transformations or events proceeded along definite routes did not create the concept of causation. The recognition of causal paths is a modification of the idea of cause and not its originator. The substitution for the idea of the metamorphosis of the seed into the plant of the notion that the one develops according to definite laws into the other, presented the original causal notion in a different aspect. Magical forces, exercised by a powerful magician or operating through prescribed ceremonies, compelled, in the belief of the totemist, the growth of the plant. The causal compulsion is simply differently conceived when it is realized that the qualities of the seed and the favoring influences of soil, warmth, moisture, air, and light conjoin to produce growth. This alteration of conception is one of the most important, if not the most important, truths imposed upon the human mind by experience.

Men must have realized from the first that appropriate means must be used to attain certain ends. The conception of a primitive belief in absolute magical forces that could virtually create any transformation whatever is therefore a limiting conception. Lotze remarks that causes were first appreciated in the workshop. The early stone-workers must have learned the technique of knapping flints. There would be no fire without rubbing together two sticks or twirling a hard point on a soft block or striking a flint. But the primitive mind was dominated by the notion of absolute magical forces that constrained changes and events. Never or seldom, Dr. Frazer points out, do primitive peoples ascribe death to natural causes. The man does not die because a spear pierced his heart but because the thrower or his spear was magically potent. This domination by the magical contrasts sharply with the modern realization that the universe is a complex of causal paths. Slowly and laboriously the causal sequences that determine all events were brought to light. The conviction that the regularity of law ruled over all was gradually established.

The whole complex of causal paths is not yet unraveled. Perhaps it never will be; perhaps the belief in an absolute uniformity is as too absolute in one direction as the primitive belief in absolute magical forces was too absolute in another. Absolute uniformity, rigid determination, is, indeed, perhaps as much a limiting conception when applied to the modern mind as the notion of absolute magical forces is a limiting concept when applied to the primitive consciousness. In neither case does the principle hold *in toto*. The primitive combines some appreciation of defined causal sequences with his dominant notion of unrestricted magical forces (unrestricted except by their own degree of potency), and the modern mind is loth to believe that in the sphere of will, and it may be in nature, there is an absolute reign of law. But two dominant conceptions concerning all transformations and happenings separate the primitive from the modern mind. The primitive mind is dominated by the notion of metamorphosis—by the belief in the operation of magical forces that are unrestricted by causal paths. Magical potency converts life into death, seed into plant, or draws the fire from the stick. Experience slowly but surely replaces the principle of metamorphosis by the principle of orderly passage or development, as causal sequences come to light and force on the mind the recognition that causal action has sequences prescribed for it.

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